



SEQUENCE LISTING

RECEIVED
FEB 04 2002
TECH CENTER 1600/2800

<110> Rao, Gururaj A.
Major Sleister, Heidi

<120> Compositions and Methods for Altering Amino Acid
Content of Proteins

<130> 5718-16

<140> 08/988,015

<141> 1997-12-10

<160> 11

<170> PatentIn Ver. 2.0

<210> 1

<211> 218

<212> PRT

<213> Glycine max

<400> 1

Arg Ser Ser Glu Val Lys Cys Ala Ser Phe Arg Leu Ala Val Glu Ala
1 5 10 15

His Asn Ile Arg Ala Phe Lys Thr Ile Pro Glu Glu Cys Val Ser Pro
20 25 30

Thr Lys Asp Tyr Ile Asn Gly Glu Gln Phe Arg Ser Asp Ser Lys Thr
35 40 45

Val Asn Gln Gln Ala Phe Phe Tyr Ala Ser Glu Arg Glu Val His His
50 55 60

Asn Asp Ile Phe Ile Phe Gly Ile Asp Asn Thr Val Leu Ser Asn Ile
65 70 75 80

Pro Tyr Tyr Glu Lys His Gly Tyr Gly Val Glu Glu Phe Asn Glu Thr
85 90 95

Leu Tyr Asp Glu Trp Val Asn Lys Gly Asp Ala Pro Ala Leu Pro Glu
100 105 110

Thr Leu Lys Asn Tyr Asn Lys Leu Leu Ser Leu Gly Phe Lys Ile Val
115 120 125

Phe Leu Ser Gly Arg Tyr Leu Asp Lys Met Ala Val Thr Glu Ala Asn

130 135 140
 Leu Lys Lys Ala Gly Phe His Thr Trp Glu Gln Leu Ile Leu Lys Asp
 145 150 155 160
 Pro His Leu Ile Thr Pro Asn Ala Leu Ser Tyr Lys Ser Ala Met Arg
 165 170 175
 Glu Asn Leu Leu Arg Gln Gly Tyr Arg Ile Val Gly Ile Ile Gly Asp
 180 185 190
 Gln Trp Ser Asp Leu Leu Gly Asp His Arg Gly Glu Ser Arg Thr Phe
 195 200 205
 Lys Leu Pro Asn Pro Met Tyr Tyr Ile Glu
 210 215

<210> 2
 <211> 218
 <212> PRT
 <213> Glycine max

<400> 2
 Arg Thr Pro Glu Val Lys Cys Ala Ser Trp Arg Leu Ala Val Glu Ala
 1 5 10 15
 His Asn Ile Phe Gly Phe Glu Thr Ile Pro Glu Glu Cys Val Glu Ala
 20 25 30
 Thr Lys Glu Tyr Ile His Gly Glu Gln Tyr Arg Ser Asp Ser Lys Thr
 35 40 45
 Val Asn Gln Gln Ala Tyr Phe Tyr Ala Arg Asp Leu Glu Val His Pro
 50 55 60
 Lys Asp Thr Phe Val Phe Ser Ile Asp Asn Thr Val Leu Ser Asn Ile
 65 70 75 80
 Pro Tyr Tyr Lys Lys His Gly Tyr Gly Val Glu Lys Phe Asn Ser Thr
 85 90 95
 Leu Tyr Asp Glu Trp Val Asn Lys Gly Asn Ala Pro Ser Leu Pro Glu
 100 105 110
 Thr Leu Lys Asn Tyr Asn Lys Leu Val Ser Leu Gly Phe Lys Ile Ile
 115 120 125

Phe Leu Ser Gly Arg Thr Leu Asp Lys Gln Ala Val Thr Glu Ala Asn
 130 135 140

Leu Lys Lys Ala Gly Tyr His Thr Trp Glu Lys Leu Ile Leu Lys Asp
 145 150 155 160

Pro Gln Pro Ser Thr Pro Asn Ala Val Ser Tyr Lys Thr Ala Ala Arg
 165 170 175

Glu Lys Leu Ile Arg Gln Gly Tyr Asn Ile Val Gly Ile Ile Gly Asp
 180 185 190

Gln Trp Ser Asp Leu Leu Gly Gly His Arg Gly Glu Ser Arg Thr Phe
 195 200 205

Lys Leu Pro Asn Pro Leu Tyr Tyr Ile Gln
 210 215

<210> 3

<211> 214

<212> PRT

<213> Lycopersicon esculentum

<400> 3

Leu Lys Cys Thr Thr Trp Arg Phe Val Val Glu Thr Asn Asn Leu Ser
 1 5 10 15

Pro Trp Lys Thr Ile Pro Glu Glu Cys Ala Asp Tyr Val Lys Glu Tyr
 20 25 30

Met Val Gly Pro Gly Tyr Lys Met Glu Ile Asp Arg Val Ser Asp Glu
 35 40 45

Ala Gly Glu Tyr Ala Lys Ser Val Asp Leu Gly Asp Asp Gly Arg Asp
 50 55 60

Val Trp Ile Phe Asp Val Asp Glu Thr Leu Leu Ser Asn Leu Pro Tyr
 65 70 75 80

Tyr Ser Asp His Arg Tyr Gly Leu Glu Val Phe Asp Asp Val Glu Phe
 85 90 95

Asp Lys Trp Val Glu Asn Gly Thr Ala Pro Ala Leu Gly Ser Ser Leu
 100 105 110

Lys Leu Tyr Gln Glu Val Leu Lys Leu Gly Phe Lys Val Phe Leu Leu
 115 120 125

Thr Gly Arg Ser Glu Arg His Arg Ser Val Thr Val Glu Asn Leu Met
 130 135 140

Asn Ala Gly Phe His Asp Trp His Lys Leu Ile Leu Arg Gly Ser Asp
 145 150 155 160

His Gly Lys Thr Ala Thr Thr Tyr Lys Ser Glu Arg Arg Asn Ala Met
 165 170 175

Val Glu Glu Gly Phe Arg Ile Val Gly Asn Ser Gly Asp Gln Trp Ser
 180 185 190

Asp Leu Leu Gly Ser Ser Met Ser Tyr Arg Ser Phe Lys Leu Pro Asn
 195 200 205

Pro Met Tyr Tyr Ile Leu
 210

<210> 4

<211> 217

<212> PRT

<213> Phaseolus vulgaris

<400> 4

Ser Asp Thr Glu Val Arg Cys Ala Ser Trp Arg Leu Ala Val Glu Ala
 1 5 10 15

Gln Asn Ile Phe Gly Phe Glu Thr Ile Pro Gln Gln Cys Val Asp Ala
 20 25 30

Thr Ala Asn Tyr Ile Glu Gly Gly Gln Tyr Arg Ser Asp Ser Lys Thr
 35 40 45

Val Asn Gln Gln Ile Tyr Phe Phe Ala Arg Asp Arg His Val His Glu
 50 55 60

Asn Asp Val Ile Leu Phe Asn Ile Asp Gly Thr Ala Leu Ser Asn Ile
 65 70 75 80

Pro Tyr Tyr Ser Gln His Gly Tyr Gly Ser Glu Lys Phe Asp Ser Glu
 85 90 95

Arg Tyr Asp Glu Glu Phe Val Asn Lys Gly Glu Ala Pro Ala Leu Pro
 100 105 110

Glu Thr Leu Lys Asn Tyr Asn Lys Leu Val Ser Leu Gly Tyr Lys Ile

115	120	125
Ile Phe Leu Ser Gly Arg Leu Lys Asp Lys Arg Ala Val Thr Glu Ala		
130	135	140
Asn Leu Lys Lys Ala Gly Tyr Asn Thr Trp Glu Lys Leu Ile Leu Lys		
145	150	155
Asp Pro Ser Asn Ser Ala Glu Asn Val Val Tyr Lys Thr Ala Glu Arg		
165	170	175
Ala Lys Leu Val Gln Glu Gly Tyr Arg Ile Val Gly Asn Ile Gly Asp		
180	185	190
Gln Trp Asn Asp Leu Lys Gly Glu Asn Arg Ala Ile Arg Ser Phe Lys		
195	200	205
Leu Pro Asn Pro Met Tyr Tyr Thr Lys		
210	215	

<210> 5

<211> 214

<212> PRT

<213> Arabidopsis thaliana

<400> 5

Pro Asn Cys Arg Ser Trp His Leu Gly Phe Glu Thr Ser Asn Met Ile
1 5 10 15

Asn Phe Asp Thr Val Pro Ala Asn Cys Lys Ala Tyr Val Glu Asp Tyr
20 25 30

Leu Ile Thr Ser Lys Gln Tyr Gln Tyr Asp Ser Lys Thr Val Asn Lys
35 40 45

Glu Ala Tyr Phe Tyr Ala Lys Gly Leu Ala Leu Lys Asn Asp Thr Ile
50 55 60

Asn Val Trp Ile Phe Asp Leu Asp Asp Thr Leu Leu Ser Ser Ile Pro
65 70 75 80

Tyr Tyr Ala Lys Tyr Gly Tyr Gly Thr Glu Asn Thr Ala Ala Gly Ala
85 90 95

Tyr Trp Ser Trp Leu Val Ser Gly Glu Thr Pro Gly Leu Pro Glu Thr
100 105 110

Leu His Leu Tyr Glu Asn Leu Leu Glu Leu Gly Ile Glu Pro Ile Ile
 115 120 125

Ile Ser Asp Arg Trp Lys Lys Leu Ser Glu Ile Thr Ile Glu Asn Leu
 130 135 140

Lys Ala Val Gly Val Thr Lys Trp Lys His Val Ile Leu Lys Pro Asn
 145 150 155 160

Gly Lys Leu Thr Gln Val Val Tyr Lys Ser Lys Val Arg Asn Gly Leu
 165 170 175

Val Arg Gln Gly Tyr Asn Ile Val Gly Ile Ile Gly Asp Gln Trp Ala
 180 185 190

Asp Leu Val Glu Asp Thr Pro Gly Arg Val Phe Lys Leu Pro Asn Pro
 195 200 205

Leu Tyr Tyr Val Pro Ser
 210

<210> 6

<211> 220

<212> PRT

<213> Arabidopsis thaliana

<400> 6

Ser Ile Asn Tyr Pro Asn Cys Arg Ser Trp His Leu Gly Val Glu Thr
 1 5 10 15

Ser Asn Ile Ile Asn Phe Asp Thr Val Pro Ala Asn Cys Lys Ala Tyr
 20 25 30

Val Glu Asp Tyr Leu Ile Thr Ser Lys Gln Tyr Gln Tyr Asp Ser Lys
 35 40 45

Thr Val Asn Lys Glu Ala Tyr Phe Tyr Ala Lys Gly Leu Ala Leu Lys
 50 55 60

Asn Asp Thr Val Asn Val Trp Ile Phe Asp Leu Asp Asp Thr Leu Leu
 65 70 75 80

Ser Ser Ile Pro Tyr Tyr Ala Lys Tyr Gly Tyr Gly Thr Glu Asn Thr
 85 90 95

Ala Pro Gly Ala Tyr Trp Ser Trp Leu Glu Ser Gly Glu Ser Thr Pro
 100 105 110

Gly Leu Pro Glu Thr Leu Tyr Leu Tyr Glu Asn Leu Leu Glu Leu Gly
 115 120 125

Ile Glu Pro Ile Ile Ile Ser Asp Arg Trp Lys Lys Leu Ser Glu Val
 130 135 140

Thr Val Glu Asn Leu Lys Ala Val Gly Val Thr Lys Trp Lys His Leu
 145 150 155 160

Ile Leu Lys Pro Asn Gly Ser Lys Leu Thr Gln Val Val Tyr Lys Ser
 165 170 175

Lys Val Arg Asn Ser Leu Val Lys Lys Gly Tyr Asn Ile Val Gly Asn
 180 185 190

Ile Gly Asp Gln Trp Ala Asp Leu Val Glu Asp Thr Pro Gly Arg Val
 195 200 205

Phe Lys Leu Pro Asn Pro Leu Tyr Tyr Val Pro Ser
 210 215 220

<210> 7

<211> 219

<212> PRT

<213> Arabidopsis thaliana

<400> 7

Ser Ile Asn Tyr Ala Asn Cys Arg Ser Trp His Leu Gly Val Glu Thr
 1 5 10 15

Ser Asn Ile Ile Asp Phe Asp Thr Val Pro Ala Asn Cys Lys Asp Tyr
 20 25 30

Val Glu Asp Tyr Leu Ile Thr Ser Lys Gln Tyr Gln Tyr Asp Ser Lys
 35 40 45

Thr Val Cys Lys Glu Ala Tyr Phe Tyr Ala Lys Gly Leu Ala Leu Lys
 50 55 60

Asn Asp Thr Val Asn Val Trp Ile Phe Asp Leu Asp Asp Thr Leu Leu
 65 70 75 80

Ser Ser Ile Pro Tyr Tyr Ala Lys Tyr Gly Tyr Gly Thr Glu Lys Thr
 85 90 95

Asp Pro Gly Ala Tyr Trp Leu Trp Leu Gly Thr Gly Ala Ser Thr Pro

100	105	110
Gly Leu Pro Glu Gly Leu Tyr Leu Tyr Gln Asn Ile Ile Glu Val Gly		
115	120	125
Ile Glu Pro Ile Ile Leu Ser Val Arg Trp Lys Leu Trp Lys Asn Val		
130	135	140
Thr Leu Asn Leu Glu Ala Ala Gly Val Thr Tyr Trp Lys His Leu Ile		
145	150	155
Leu Lys Pro Asn Gly Ser Asn Leu Arg Gln Val Val Tyr Lys Ser Lys		
165	170	175
Val Arg Asn Lys Leu Val Lys Lys Gly Tyr Asn Ile Val Gly Asn Ile		
180	185	190
Gly Asp Gln Trp Ala Asp Leu Val Glu Asp Thr Pro Gly Arg Val Phe		
195	200	205
Lys Leu Pro Asn Pro Leu Tyr Tyr Val Pro Ser		
210	215	

<210> 8
 <211> 218
 <212> PRT
 <213> Glycine max

<400> 8
Arg Ser Ser Glu Met Lys Cys Ala Ser Phe Arg Leu Ala Val Glu Ala
1 5 10 15
His Asn Met Arg Ala Phe Lys Thr Ile Pro Glu Glu Cys Met Glu Pro
20 25 30
Thr Lys Asp Tyr Met Asn Gly Glu Gln Phe Arg Met Asp Ser Lys Thr
35 40 45
Val Asn Gln Gln Ala Phe Phe Tyr Ala Ser Glu Met Glu Met His His
50 55 60
Asn Asp Met Phe Ile Phe Gly Met Asp Asn Thr Met Leu Ser Asn Ile
65 70 75 80
Pro Tyr Tyr Glu Lys His Gly Tyr Gly Val Glu Glu Phe Asn Glu Thr
85 90 95

Leu Tyr Asp Glu Trp Val Asn Lys Gly Asp Ala Pro Ala Leu Pro Glu
 100 105 110

Thr Leu Lys Asn Tyr Asn Lys Leu Met Ser Leu Gly Phe Lys Met Val
 115 120 125

Phe Leu Ser Gly Arg Tyr Leu Asp Lys Met Ala Val Thr Glu Ala Asn
 130 135 140

Leu Met Lys Ala Gly Phe His Thr Trp Glu Gln Leu Ile Leu Lys Asp
 145 150 155 160

Pro His Leu Met Thr Pro Asn Ala Leu Ser Tyr Lys Ser Ala Met Arg
 165 170 175

Glu Asn Met Leu Arg Gln Gly Tyr Arg Ile Val Gly Met Ile Gly Asp
 180 185 190

Gln Trp Ser Asp Leu Leu Gly Asp His Met Gly Glu Ser Arg Thr Phe
 195 200 205

Lys Leu Pro Asn Pro Met Tyr Tyr Met Glu
 210 215

<210> 9

<211> 218

<212> PRT

<213> Glycine max

<400> 9

Arg Ser Ser Glu Met Lys Cys Ala Ser Phe Arg Leu Ala Val Glu Ala
 1 5 10 15

His Asn Met Arg Ala Phe Lys Thr Ile Pro Glu Glu Cys Met Glu Met
 20 25 30

Thr Lys Asp Tyr Met Asn Gly Glu Gln Phe Arg Met Asp Ser Lys Thr
 35 40 45

Val Asn Gln Gln Ala Phe Phe Tyr Ala Ser Glu Met Glu Met His His
 50 55 60

Met Asp Met Phe Ile Phe Gly Met Asp Asn Thr Met Leu Ser Asn Ile
 65 70 75 80

Pro Tyr Tyr Glu Lys His Gly Tyr Gly Met Glu Glu Phe Asn Glu Thr
 85 90 95

Met Tyr Asp Glu Trp Met Asn Lys Gly Asp Ala Pro Ala Leu Pro Glu
100 105 110

Thr Leu Lys Asn Tyr Asn Lys Leu Met Ser Leu Gly Phe Lys Met Val
115 120 125

Phe Met Ser Gly Arg Tyr Met Asp Lys Met Ala Val Thr Glu Ala Asn
130 135 140

Leu Met Lys Ala Gly Met His Thr Trp Glu Gln Leu Ile Leu Lys Asp
145 150 155 160

Pro His Leu Met Thr Pro Asn Ala Met Ser Tyr Lys Ser Ala Met Arg
165 170 175

Glu Asn Met Leu Arg Gln Gly Tyr Arg Ile Val Gly Met Ile Gly Asp
180 185 190

Gln Trp Ser Asp Leu Met Gly Asp His Met Gly Glu Ser Arg Met Phe
195 200 205

Lys Leu Pro Asn Pro Met Tyr Tyr Met Glu
210 215

<210> 10

<211> 218

<212> PRT

<213> Glycine max

<400> 10

Arg Ser Ser Glu Met Lys Cys Ala Ser Phe Arg Leu Ala Val Glu Ala
1 5 10 15

His Asn Met Arg Ala Phe Lys Thr Met Pro Glu Glu Cys Met Glu Met
20 25 30

Thr Lys Asp Tyr Met Asn Gly Glu Gln Phe Arg Met Asp Ser Lys Thr
35 40 45

Val Met Gln Gln Ala Phe Phe Tyr Ala Ser Glu Met Glu Met His His
50 55 60

Met Asp Met Phe Ile Phe Gly Met Asp Asn Thr Met Leu Ser Asn Met
65 70 75 80

Pro Tyr Tyr Glu Lys His Gly Tyr Gly Met Glu Glu Met Asn Glu Thr

	85	90	95
Met Tyr Asp Glu Trp Met Asn Lys Gly Asp Ala Pro Ala Leu Pro Glu			
	100	105	110
Thr Leu Lys Asn Tyr Asn Lys Leu Met Ser Leu Gly Phe Lys Met Val			
	115	120	125
Phe Met Ser Gly Arg Tyr Met Asp Lys Met Ala Val Thr Met Ala Asn			
	130	135	140
Leu Met Lys Ala Gly Met His Thr Trp Glu Gln Leu Ile Leu Lys Met			
	145	150	155
Pro His Met Met Thr Pro Asn Ala Met Ser Tyr Lys Ser Ala Met Arg			
	165	170	175
Glu Asn Met Leu Arg Gln Gly Tyr Arg Ile Val Gly Met Ile Gly Asp			
	180	185	190
Gln Trp Ser Asp Leu Met Gly Asp His Met Gly Glu Ser Arg Met Phe			
	195	200	205
Lys Leu Pro Asn Pro Met Tyr Tyr Met Glu			
	210	215	

<210> 11
 <211> 675
 <212> DNA
 <213> Glycine max

<400> 11
 ggcccagccg gccagatctt cggagatgaa atgcgctagc tttaggcttg ctgtggaagc 60
 acacaacatg cgagccttta aaaccattcc tgaagagtgc atggaaccaa caaaggacta 120
 catgaatggc gaacaatttc gaatggactc taaaacagtt aaccaacagg ccttctttta 180
 tgctagttaa atggaaatgc atcacaacga catgtttata ttcggcatgg ataacaccat 240
 gctctctaata atccatact atgaaaaaca tggatatggg gtggaggaat ttaatgaaac 300
 cttatatgat gaatgggtta acaagggcga cgcaccggca ttgccagaga ctcttaaaaa 360
 ttacaacaag ctgatgtccc ttggcttcaa gatggtattc ttgtcaggaa ggtaccttga 420
 caaaatggcc gtaacagaag caaacctaata gaaggctggc ttccacacat gggagcagtt 480
 aattctcaag gatccacatc ttatgactcc aaatgcactt tcatacaaat cagcaatgag 540
 agagaatatg ttgaggcagg gatacagaat tgttggaatg attggtgatc aatggagcga 600
 tctgcttgga gaccacatgg gcgaatctag aacctttaag cttcctaata ccatgtacta 660
 catggaggcg gccgc 675